REMARKS

In this paper, numerous pages of the specification have been amended, each of Figures 1, 1A, 1B and 2 have been modified, claims 1, 2, 4, 5, 10, 12, 17, 18, 21, 26, 28, 34 and 35 have been amended, and claims 3, 11, 13, 27 and 29 have been canceled. No new matter has been added by the amendments, support being found throughout the application as originally filed.

Claims 1, 2, 4-10, 12, 14-26, 28 and 30-38 are pending, with claims 6-9 having been withdrawn. Reconsideration of this application, as amended is requested.

Drawings and Specification Amendments

Numerous pages of the specification have been amended to correct various inadvertent errors, to more clearly phrase the description and to better conform the specification to the drawings. For example, the specification has been amended to correspond to the drawings, specifically, that "composites" are "120" and "base" is "122". Additionally, the sidewalls of composites 120 have been defined as "121", with sidewalls "124" and "127" being specific sidewalls 121. Mandrel "121" of Fig. 2 has been changed to "102", and abrasive article "100" has been changed to "101". Additionally, the section lines in Fig. 1 have been renamed to be consistent with the specification.

102 and 103 Rejections over Bruxvoort

Claims 18-21 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Bruxvoort (U.S. Pub. No. 2002/0106980). Claim 23 was rejected under 35 U.S.C. § 103(a) as obvious over Bruxvoort. Applicants disagree.

Claim 18 has been amended to clarify that it requires an abrasive feature (comprising specific binder and abrasive particles) having at least one sidewall forming a positive rake angle.

Applicants believe that there is no issue regarding the term "positive rake angle", based on the discussion provided in the paper dated January 12, 2005.

Applicants submit that Bruxvoort does not anticipate or render obvious claim 18, or any of claims 19-21 and 23 that depend therefrom, at least because Bruxvoort does not disclose or suggest any element or feature, much less an abrasive feature, having a sidewall that forms a positive rake angle. Bruxvoort provides various shapes, including pyramids, but none which have a positive

rake angle. Bruxvoort also does not suggest an abrasive feature having a sidewall that forms a positive rake angle and that has a radiused portion adjacent the base.

At least for these reasons, Applicants contend that claims 18-21 and 23 are patentable over Bruxvoort, and request that the rejection be withdrawn.

103 Rejections over Neff and/or Hoopman

Claims 1-5 and 10-38 were rejected under 35 U.S.C. 103(a) as obvious over Neff (U.S. Pat. No. 5,578,099) in view of Hoopman (U.S. Pat. No. 5,672,097).

Claims 1, 4, 10, 16, 17, 18 and 25 were rejected under 35 U.S.C. 103(a) as obvious over Neff. Claims 2-3, 5, 11-15, 19-24 and 26-38 were rejected under 35 U.S.C. 103(a) as obvious over Neff as applied to claims 1, 4, 10, 16, 17, 18 and 25, and further in view of Hoopman.

Claims 1-5 and 10-38 were rejected under 35 U.S.C. 103(a) as obvious over Hoopman in view of Neff.

Applicants disagree with each of these rejections and request they be withdrawn.

Claim 1 has been amended to clarify that the abrasive features (comprising polymeric binder and abrasive particles) have at least one sidewall forming a positive rake angle, and a planar top portion with abrasive particles thereon. Claims 2-5 further define the abrasive article of claim 1; and claim 25 defines a tool for making the abrasive article of claim 1.

Claim 10 has been amended to clarify that the abrasive features comprise polymeric binder and abrasive particles and have four surfaces and a planar surface opposite to and angled to the base, where at least one of the surfaces includes an undercut portion. Claims 11-17 further define the abrasive article of claim 10.

Claim 18 has been amended to clarify that it requires an abrasive feature (comprising polymeric binder and abrasive particles) having at least one sidewall forming a positive rake angle. Claims 19-24 further define the abrasive feature of claim 10.

Claim 26 has been amended to better clarify that the belt has a flexible backing and that the abrasive features are similar those recited in claim 10. Claims 27-33 further define the abrasive belt of claim 26.

Claim 34 has been amended to clarify that the abrasive features are similar to those recited in claim 10. Claims 35-38 further define the method of claim 34.

Applicants contend that neither Neff, Hoopman '097, nor their combination, in any order, renders the pending claims obvious, at least for the following reasons.

First, Applicants contend that the Examiner has misunderstood and misconstrued the disclosure of Neff. Neff provides various abrasive tools for material removal. Figures 10, 11 and 12 of Neff provide abrading tools that have a negative rake angle, a neutral rake angle, and a positive rake angle (column 5, lines 29-34). These abrading tools use a single point for material removal from the workpiece. Benefits for these tool configurations are discussed at column 9, lines 46-56. Applicants do not disagree that Neff discloses that a single point tool can utilize a positive rake angle. Applicants contend, however, that features from a single point tool are not applicable to abrasive articles of the present invention and as recited in the pending claims.

It is well known in the art of abrading and grinding that abrasive tools, especially single point tools such as those disclosed in Figure 10-12 of Neff, are not abrasive articles comprised of a plurality of abrasive features on a backing, particularly a flexible backing. (Applicants note that abrasive articles, as recited in the pending claims, are often referred to as "coated abrasive articles" in the abrasives art). It is abrasive articles that are the subject of the pending claims.

Abrasive tools are metallic tools that do not erode or wear away in the same manner as coated abrasives, which are composed of abrasive particles and polymeric binder. Abrasive tools rely on their hard surfaces and edges to provide the cutting mechanism that removes material from the workpiece; these surfaces and edges stay intact, other than dulling and wear. Coated abrasive articles, including composite abrasive features, wear away or erode; in essence, the abrasive coating breaks down. As the polymeric binder erodes away and abrasive particles cleave and crack, new abrasive particle surfaces to the workpiece are continuously being exposed to the workpiece. The tools of Neff are not comparable to the abrasive articles of the present invention and those of Hoopman, which both have abrasive articles having abrasive features comprising polymer binder and abrasive particles. The overall structure is different (e.g., single point cutting tool versus multiple abrasive features, and a sturdy, inflexible support versus a flexible backing), the internal structure is different (e.g., a metal material versus polymeric binder and abrasive particles), and the mode of material removal is different. At least for these reasons, Applicants contend that Neff is differentiated from, and there is no applicability of single point abrasive tools to coated abrasive articles, including those of the pending claims and of Hoopman.

As for Neff disclosing abrasive features comprising abrasive particles and polymeric binder, Applicants disagree. The single point tools of Neff, such as the tool of Figure 12 having the positive rake angle, are not composed of polymeric binder and abrasive particles. The tools of Figures 10-12 of Neff are made as described at column 9, line 57 to column 10, line 17. Briefly, cones of steel balls or magnetic particles are oriented into cones, with an appropriate magnet, and then encapsulated with a braze paste. The result is a metal cutting point for a tool. Neff does disclose that abrasive particles in a binder can be used during the manufacture of the tools. The binder is a temporary adhesive, used to maintain the cone shape until the tool has formed at high temperature, e.g., brazed. The temporary adhesive and abrasive particles could be used in mold, prior to exposure to high temperature which includes burning or vaporizing off the binder. In the final product, no polymeric binder remains in the abrasive feature to hold the abrasive particles together. This is another point that differentiates Neff from Hoopman and the invention of the present claims.

Even if one were to turn to Neff, the abrasive articles of the pending claims now require the abrasive features on a flexible backing. The abrasive tools of Neff, as are all tools, are supported by a rigid, inflexible backing. A cutting tool would not function properly if not rigidly supported. Having a flexible backing also moves Hoopman and the pending claims away from Neff.

The various points above have supported Applicants' contention that the disclosure of Neff (e.g., a single point tool with a positive rake angle) is not applicable to abrasive articles of the present invention and as recited in the pending claims. Even if Neff is combined with Hoopman, in either order, the pending claims are still not obvious.

The Office Action agrees that Hoopman does not disclose abrasive features with positive rake angles (page 8). As provided above, the positive rake angle used for cutting tools by Neff would not be obvious to use in abrasive articles of the pending claims, because the cutting tools are not analogous to abrasive articles.

On page 5, the Office Action points to column 9, lines 55-56 of Neff for the benefit of using a positive rake angle. This clause states that "a positive rake angle ... is preferred in aggressive-rate material removal applications." Applicants do not disagree that this might be true for material removal applications that use a single point abrasive tool. However, the pending

claims are directed to abrasive articles having a plurality of abrasive features, not to single point abrasive tools.

Even if the positive rake angle of Neff were applied to Hoopman, additional features recited in the claims are still lacking.

For example, the combination of the positive rake angle of Neff to Hoopman is still lacking an abrasive feature with positive rake angle and a planar top surface. The Office Action contends that the features of Neff could be any shape. Applicants disagree. Neff discloses cones with negative, neutral, or positive rake angles; Neff does not disclose or suggest truncated features, which have a planar surface, as are recited by the pending claims. From the teachings of Neff, one would not progress far from shapes other than cones or pyramids (cones having surfaces or sides), because in the disclosure of Neff, all discussion and figures are to cones and to methods of making the cones. There is no suggestion that a shape other than those having a distal point could be used. Indeed, for single point tools, which is the basis of Neff, a point is needed for the tool to properly cut. It is not logical for one reading Neff, which describes orienting cones with magnets, and reviewing the figures of Neff, to arrive at abrasive features that have a planar flat top surface, much less one angled in relation to the base.

The Office Action states on page 5 that the limitation of having a flat, angled top "is obvious because it is the examiners [sic] position that this limitation would have been obvious to the skilled artisan in order to assist is [sic] removing material from the workpiece." Applicants do not understand where this logic comes from. It is described in the pending application, for example at page 20, lines 24 et seq., when using an abrasive feature, as defined by the pending claims, the undercut face, which has the positive rake angle, is the leading edge of the composite. The planar top surface is not a cutting surface, but finely refines the surface, for example, so that a wood surface can be stained.

There are additional recitations in the pending claims that are lacking in the combination of Neff and Hoopman. For example, claims 1, 12, 22, 28 and 35 recite additional abrasive particles present on the top surface. There is no disclosure or suggestion in none of Neff, Hoopman, nor their combination, of such.

Claims 14, 15, 23, 24, 30, 31, and 36 recite having a radius portion adjacent the base on the undercut or positive rake angle portion. There is no disclosure or suggestion in none of Neff,

Hoopman, nor their combination, of such. Additionally, as discussed in the application, for example at page 20, lines 19-23, the radiused portions of the abrasive feature adjacent the backing facilitate the removal of swarf from the abrasive article; this is recited in pending claim 37. There is no suggestion in Neff or in Hoopman that such a design feature would provide the recited benefits.

For these reasons, and for others not detailed herein, Applicants contend that it would not have been obvious to one skilled in the art of abrasive articles to arrive at the pending claims. Withdrawal of these rejections, and a Notice of Allowance, is requested.

SUMMARY

In view of the above amendments and remarks, Applicant respectfully requests a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone Applicant's attorney Dan Biesterveld, Reg. No. 45,898, at 651.737.3193.

Respectfully submitted,

Date: November 10, 2005

Mara E. DeBoe
Reg. No. 40,066

Inventor: Provow et al.
Docket No.: 58727US002
Title: Abrasive Articles and Methods for Making the Same
Serial No.: 10/688,735
Annotated Sheet

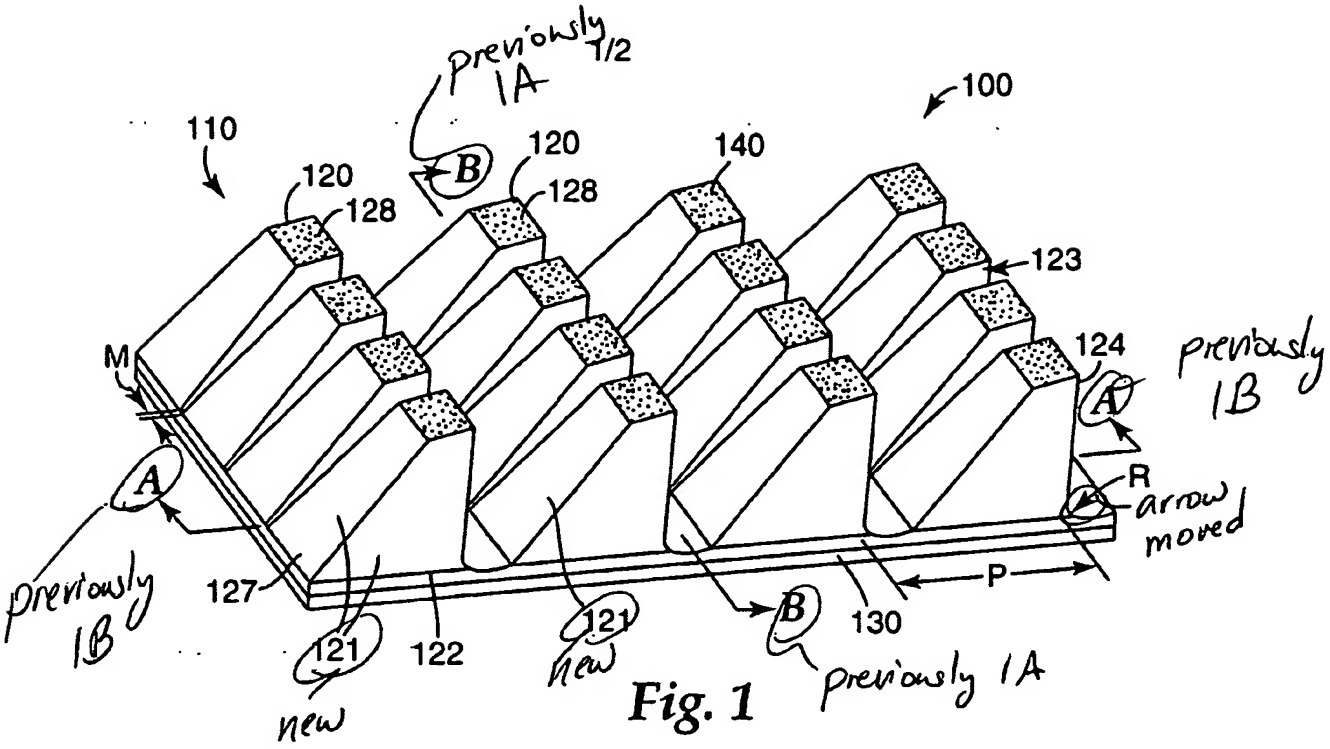

Fig. 1

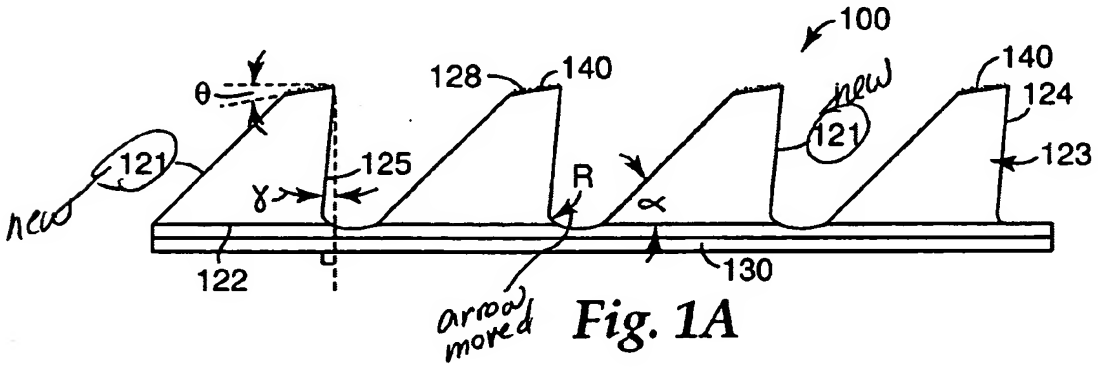

Fig. 1A

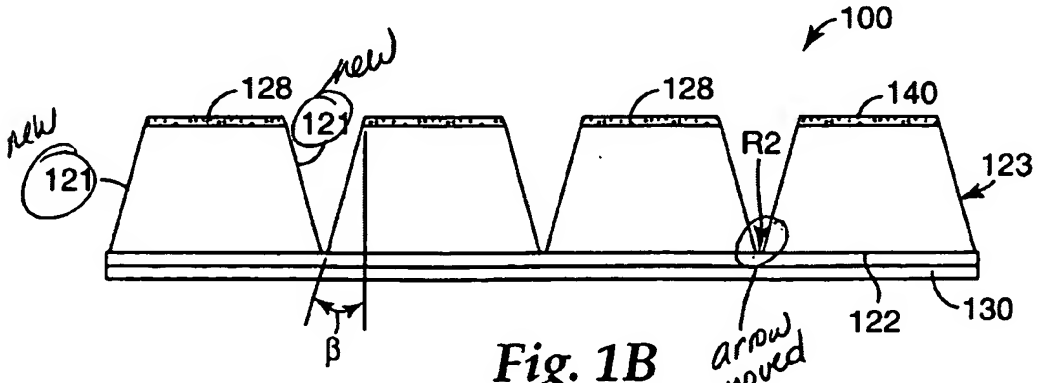

Fig. 1B

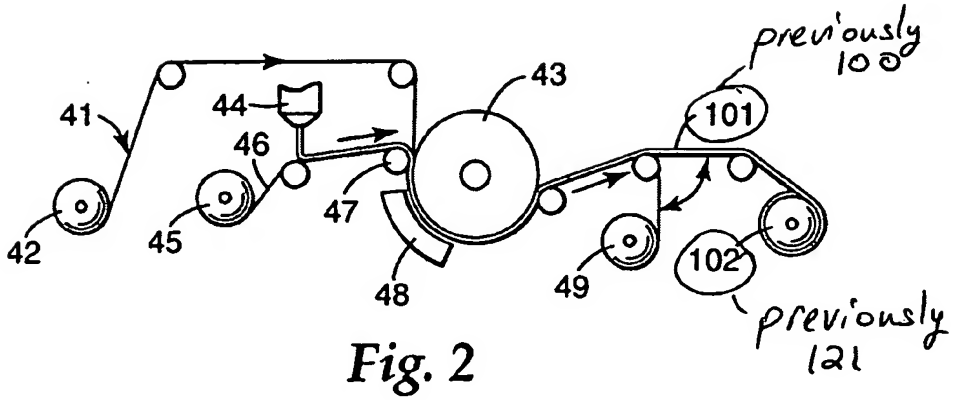
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Fig. 2

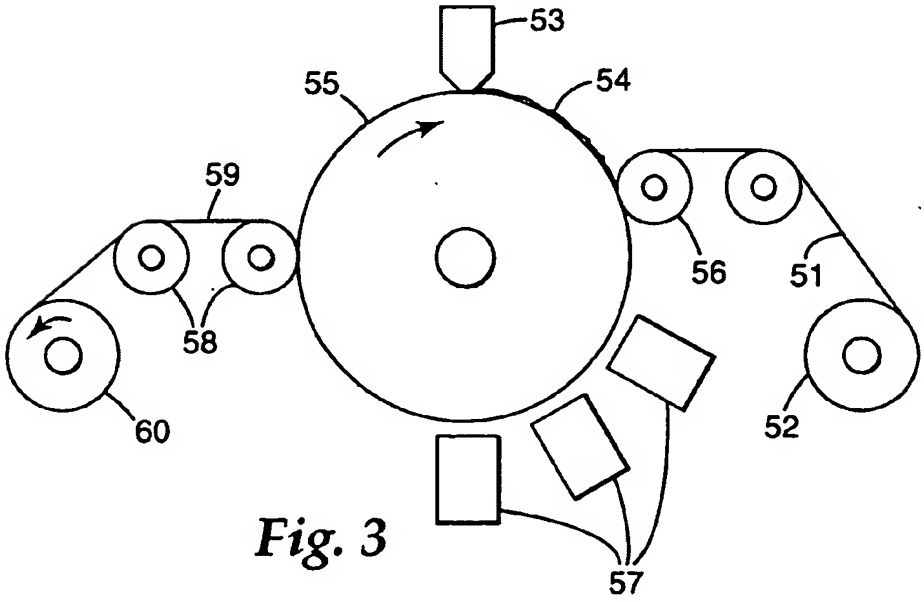
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Fig. 3